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(54) STRIP ARTICULATION MEMBER TO ARTICULATE TWO ELEMENTS WITH RESPECT TO EACH OTHER

(57) Articulation member to articulate two elements (12, 13) with respect to each other, comprising two attachment blocks (19, 20) and a strip (14) of flexible material, wherein each attachment block (19, 20) comprises an external surface (24) and an internal surface (25) that form between them a determinate angle (α) of less than 90°. The strip (14) is configured to be attached along its lateral zones (14a, 14b) to the internal surfaces (25) of the attachment blocks (19, 20) so that the strip (14) is bent by an angle at the top of less than 180° when the two elements (12, 13) to be articulated are disposed in a closed position, with the external surfaces (24) of the attachment blocks (19, 20) parallel to each other and facing each other.

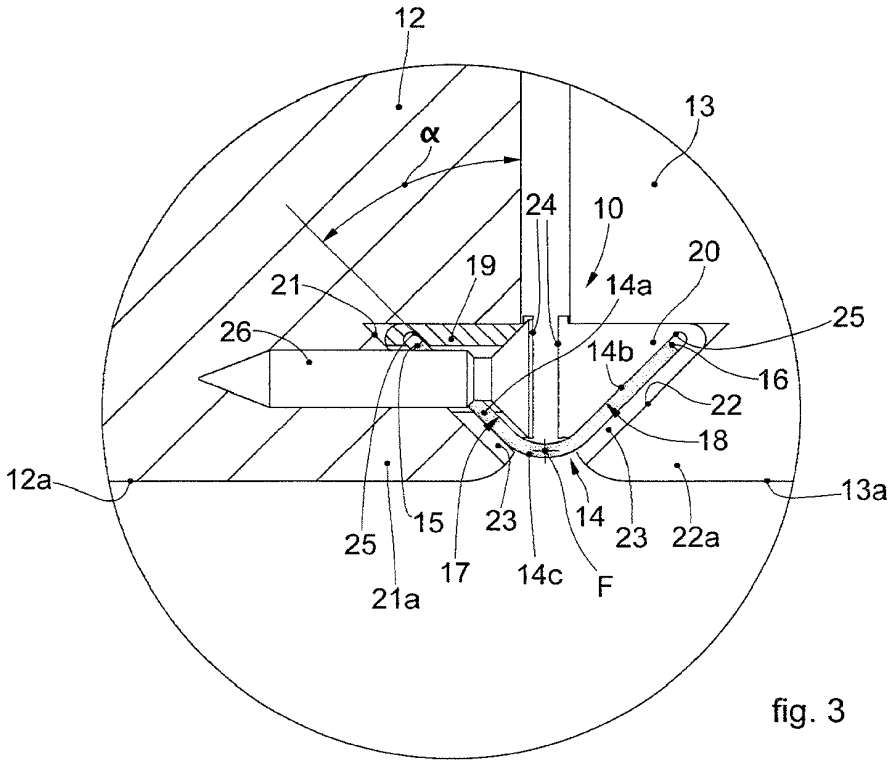

fig. 3

EP 3 269 911 A1

Description

FIELD OF THE INVENTION

[0001] The present invention concerns a strip or belt-type articulation member, to articulate two elements with respect to each other. The field of application of the articulation member according to the present invention is extremely wide, and covers all those fields where there is a need to articulate two elements with respect to each other, such as for example a panel of a door or window or a furnishing element with respect to a fixed structure, such as the frame of a door or window or of the furnishing element, or two parts of a door or window, or other.

BACKGROUND OF THE INVENTION

[0002] In the field of articulation members, such as hinges, suitable to articulate two elements, that is, so that they can articulate one with respect to the other, passing for example from a closed position to an open position or vice versa, so-called strip or belt hinges are known, which comprise a central element consisting precisely of a strip of flexible material, which can be metal, plastic, composite, rubber, fabric, mesh or other, and having an edge configured to be attached to one of the elements to be articulated and an opposite edge configured to be attached to the other of the two elements to be articulated.

[0003] For example, from the French patent application FR-A-2,383,585 a strip hinge is known, in which a strip of fabric has its two opposite lateral edges which can be inserted into two corresponding oblong slits of the two elements to be articulated. However, this known hinge requires that each lateral edge of the strip of fabric is provided with a thicker part, suitable to enter into a corresponding longitudinal widening of the slit to prevent the strip from inadvertently or undesirably escaping from the slits.

[0004] The presence of these parts on the edges of the strip, however, makes the known hinged rather expensive to make and complicated to insert into the corresponding slits of the two elements to be articulated.

[0005] From the Dutch patent NL-A-7102126 a strip hinge is known, in which a strip of flexible material, having substantially the shape of an oblong parallelepiped with a rectangular cross section, has the two lateral edges that are each shaped to define a longitudinal bulge along the whole length, which has a circular cross section, with a bigger diameter than the thickness of the central part of the strip. The two longitudinal bulges can be inserted into corresponding cylindrical seatings made in the two elements to be articulated. This known hinge has the disadvantage that the insertion of the two longitudinal bulges into the corresponding cylindrical seatings is very difficult to effect due to the reciprocal friction and the length of the strip and the seatings.

[0006] From US-A-2,507,965 a strip hinge is known, similar to that described in the Dutch patent application NL-A-7102126 described above, in which, however, the strip is of rubber and the longitudinal bulges have a rectangular cross section larger than the thickness of the central part of the strip. The two longitudinal bulges can be inserted into corresponding seatings with an oblong parallelepiped shape made in the two elements to be articulated. This known hinge also has the disadvantage that the insertion of the two longitudinal bulges into the corresponding oblong parallelepiped shaped seatings is very difficult to effect due to the reciprocal friction and the length of the strip and the seatings.

[0007] From U.S. 5,054,536 a strip hinge is known, in which a strip of flexible material that has a very particular and complex shape, with two longitudinal bulges in correspondence with the lateral edges, with a substantially trapezoidal cross section, larger than the thickness of the central part of the strip. Complementary elements are also provided to hold the strip inside corresponding shaped seatings made in the two elements to be articulated. This known hinge too, in addition to the complexity of the strip, which does not make its construction easy and economical, has the disadvantage that the insertion of the two longitudinal bulges into the corresponding shaped seatings is very difficult and complex to carry out.

[0008] From the French patent application FR-A-2,736,379 a strip hinge is known, in which an elastic strip having a shape that defines a thicker central zone and two heads at the ends, each consisting of a longitudinal bulge, with a cross section that can be trapezoidal, circular, semi-circular or rounded. The two heads can be inserted into corresponding shaped seatings made in the two elements to be articulated. This known hinge too, in addition to the complexity of the strip, which does not make its construction easy and economical, has the disadvantage that the insertion of the two longitudinal bulges into the corresponding shaped seatings is very difficult and complex to carry out.

[0009] From the German patent application DE-A-3116146 a strip hinge is known, in which a flexible strip with a rectangular cross section is glued to the two elements to be articulated. In particular, each of the two elements to be articulated is divided into two parts, which keep the corresponding part of the flexible strip glued together. This known hinge is indeed simple, but it has the disadvantage that the flexible strip is glued between the parts of the elements to be articulated and is therefore difficult to remove and replace when necessary.

[0010] One purpose of the present invention is to obtain a strip articulation member, which is simple, effective and inexpensive, and at the same time allows easy and quick assembly of the parts that constitute it in the two elements to be articulated with each other.

[0011] Another purpose of the present invention is to obtain a strip articulation member which has the axis of the articulation, or fulcrum, as close as possible to the external surfaces of the two elements to be articulated, so that the latter can perform as big an angular travel as possible when they move from a closed position to an

open position, or vice versa.

[0012] Another purpose of the present invention is to obtain a strip articulation member which, during use, is almost completely inserted inside the two elements to be articulated so that when the latter are in a closed position, the part of the strip articulation member visible from the outside is minimized, so that it becomes a "hidden" articulation member.

[0013] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0014] The present invention is set forth and characterized in the independent claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0015] In accordance with the above purposes, an articulation member according to the present invention, to articulate two elements with respect to each other, such as for example a panel of a door or window or of a furnishing element, with respect to a fixed structure such as the frame of the door or window or of the furnishing element, or two parts of a door or window or other, comprises two attachment blocks one configured to be associated with a first of the elements and the other with a second of the elements, and a strip of flexible material, having substantially the shape of an oblong parallelepiped with two lateral edges parallel to each other, between which two lateral zones are comprised and a central zone configured to act as a fulcrum. Furthermore, the strip is configured to be attached with its lateral zones to the two attachment blocks.

[0016] According to a first characteristic aspect of the present invention, each of the two attachment blocks comprises an external surface and an internal surface that form between them a determinate angle of less than 90°. The strip also has a substantially constant thickness and is configured to be attached in correspondence with its lateral zones to the internal surfaces of the two attachment blocks, by means of a containing element belonging, or coupled to each of the attachment blocks, so that the strip is bent by an angle at the top of less than 180° when the two elements to be articulated are disposed in a closed position, with the external surfaces of the latter two parallel to each other and facing each other.

[0017] According to another characteristic aspect of the present invention, the attachment blocks are identical to each other and are configured to be assembled in a specular manner in corresponding seatings of the two elements to be articulated.

[0018] According to another characteristic aspect of the present invention, the attachment blocks have an oblong shape, with a cross section substantially in the shape of a right triangle, in which said external surface is parallel to, or coincides with, a side of said right triangle and said internal surface is parallel to, or coincides with, the hypotenuse of the right triangle.

[0019] According to another characteristic aspect of the present invention, said determinate angle is comprised between 5° and 85°, preferably about 45°, so that the strip is bent by an angle at the top comprised between 10° and 180°, preferably about 90° when the two elements to be articulated are disposed in the closed position.

[0020] According to another characteristic aspect of the present invention, each attachment block comprises a slit with a width substantially equal to the thickness of the strip and configured to accommodate with slight play a corresponding lateral zone of the latter, wherein the internal surface of each of the attachment blocks constitutes one of the internal walls of the corresponding slit.

[0021] According to another characteristic aspect of the present invention, each slit defines a thin flexible tongue disposed cantilevered and in a single body with the remaining part of the attachment block, and configured to clamp, during use, a lateral zone of the strip against the corresponding internal surface of the attachment block.

[0022] According to a variant of the present invention, the attachment blocks have an oblong shape, with a cross section substantially in the shape of a right trapezoid, wherein the external surface is parallel to, or coincides with, the base of the right trapezoid and the internal surface is parallel to, or coincides with, the inclined side of the right trapezoid.

[0023] According to another characteristic aspect of the present invention, each of the attachment blocks is configured to be coupled to a containing element which also has its cross section substantially in the shape of a right trapezoid, hollow inside.

[0024] According to another characteristic aspect of the present invention, the strip is configured to be clamped with its lateral zones between the internal surface of each attachment block and the corresponding containing element.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] These and other characteristics of the present invention will become apparent from the following description of some embodiments, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic view, partly sectioned, of an articulation member according to the present invention, according to a first embodiment, shown assembled on a door or window that comprises a fixed structure and a mobile element, in which the latter is in a closed position;
- fig. 2 is a schematic view of the articulation member of fig. 1 with the mobile element of the door or window in an open position;

- fig. 3 is an enlarged detail of fig. 1;
- fig. 4 is a three-dimensional view of the articulation member of fig. 1;
- fig. 5 is an enlarged detail of fig. 4;
- fig. 6 is an exploded view of the disassembled components of the articulation member of fig. 1;
- fig. 7 is a schematic view, partly sectioned, of an articulation member according to the present invention, according to a second embodiment, shown assembled on a door or window that comprises a fixed structure and a mobile element, in which the latter is in a closed position;
- fig. 8 is an enlarged detail of fig. 7;
- fig. 9 is an exploded view of the disassembled components of the articulation member of fig. 7

DETAILED DESCRIPTION OF SOME EMBODIMENTS OF THE PRESENT INVENTION

[0026] To simplify the description of the present invention, the same reference numbers refer to identical parts, or very similar parts, in the different embodiments.

[0027] With reference to fig. 1, an articulation member 10 according to the present invention, in accordance with a first embodiment, is shown assembled on a door or window 11 to articulate a mobile element 12, which can be, for example, a door, window, or panel, with respect to a fixed structure 13 which can be, for example, the frame of the door or window 11. In particular, the mobile element 12 can perform an angular travel of up to 180°, although in the representation shown here it is limited to about 140°, moving from a closed position, shown in figs 1, 3, 4 and 5, to an open position, shown in fig. 2, or vice versa. In particular, in the closed position, the two external surfaces 12a and 13a of the mobile element 12 and respectively of the fixed structure 13 are coplanar with each other. Furthermore, the amplitude of the angular travel can increase up to 180° by increasing the distance of the mobile element 12 from the fixed structure 13, when the first of the two is in the closed position.

[0028] The articulation member 10 comprises a strip 14 of flexible material having substantially the shape of an oblong parallelepiped, with two lateral edges 15 and 16 (figs. 3 and 6) parallel to each other, which define two lateral zones 14a and 14b and central zone 14c in which the axis of articulation or fulcrum F is disposed. Indicatively, in the example provided here, the strip 14 is made of one or more wires or strands of non-extensible material, such as nylon or steel, preferably woven together, it has a width comprised between 10 mm and 50 mm, preferably between 15 mm and 30 mm, and a substantially constant thickness comprised between 0.5 mm and 3 mm, preferably between 1 and 2 mm.

[0029] The strip 14 is configured to be clamped, or attached, along its lateral zones 14a and 14b, in two corresponding slits 17 and 18 (figs. 3 and 5), each of which is made on an attachment block 19, respectively 20. The width, that is, the smaller side of each slit 17 and 18, is equal to the thickness of the strip 14.

[0030] Preferably, the two attachment blocks 19 and 20 (fig. 6) are identical to each other, have an oblong shape, with a cross section substantially in the shape of a right triangle, and are made of a metal section bar. The two attachment blocks 19 and 20 are configured to be inserted specularly into corresponding seatings 21, respectively 22 (figs. 3 and 6), one made in the mobile element 12 and the other in the fixed structure 13. Therefore, in the example provided here, the cross section of each of the two seatings 21 and 22 is substantially a right triangle.

[0031] It should be noted that in the mobile element 12 and in the fixed structure 13 there is a pointed part 21a, respectively 22a, between their external surfaces 12a, 13a and the two seatings 21, 22 which, in practice, hides the attachment blocks 19 and 20 from view when the mobile element 12 is in the closed position (figs. 1, 3, 4 and 5).

[0032] The two slits 17 and 18 are substantially parallel to the surface that defines the hypotenuse of the cross section of the corresponding attachment block 19 and 20 and each defines a thin flexible tongue 23 (figs. 3 and 6) which, during use, is inside the seating 21, respectively 22. Therefore, each flexible tongue 23 is disposed cantilevered and in a single body with the remaining part of the corresponding attachment block 19 and 20.

[0033] Each attachment block 19 and 20 has an external surface 24 and an internal surface 25 which constitutes one of the internal walls of the corresponding slit 17 and 18 and forms an angle α comprised between 5° and 85°, preferably 45°, with the external surface 24. In this way, when the mobile element 12 of the door or window 11 is in the closed position (figs. 1, 3, 4 and 5), the external surfaces 24 (fig. 3) of the two attachment blocks 19 and 20 are parallel to one another and facing one another, and the strip 14 is bent with an angle at the top comprised between 10° and 180°, preferably 90°.

[0034] Clamping the strip 14 inside the two slits 17 and 18 and the simultaneous attachment of each attachment block 19 and 20 in the corresponding seatings 21 and 22 is obtained by means of screws 26 (figs. 3 and 6), for example self-tapping screws, which, by exploiting the elasticity of the thin flexible tongue 23, clamp the strip 14 inside the slits 17 and 18.

[0035] The screws 26 are suitable to be inserted into corresponding through holes 27 (fig. 6) made in the two attachment blocks 19 and 20 in order to screw into the mobile element 12 and the fixed structure 13.

[0036] The assembly of the articulation member 10 is very simple and economical. In fact, in order to articulate the mobile element 12 with respect to the fixed structure 13 of the door or window 11, it is sufficient to precisely insert the two lateral edges 15 and 16 and the lateral zones 14a and 14b of the strip 14 into the slits 17 and 18 of the two attachment blocks 19 and 20, to position the latter in the seatings 21 and 22 and attach them by means of the screws 26, thus clamping the strip 14 by means of

the flexible tongues 23 inside the slits 17 and 18.

[0037] According to a second embodiment, shown in figs. 7, 8 and 9, an articulation member 110 differs from the articulation member 10 described heretofore in the shape of the attachment blocks.

[0038] In fact, the two attachment blocks 119 and 120 of the articulation member 110 each have a cross section substantially shaped as a right trapezoid and comprises an external surface 124 that defines the base of the right trapezoid, and an internal surface 125 which defines the inclined side of the right trapezoid, in which the two surfaces 124 and 125 form between them a determinate angle α comprised between 5° and 85°, preferably 45°.

[0039] Also the corresponding seatings 121 and 122, one made in the mobile element 12 and the other in the fixed structure 13, each have a cross section substantially shaped as a right trapezoid.

[0040] In this second embodiment, instead of in the slits 17 and 18, through the flexible tongues 23, the strip 14 is clamped and blocked between the internal surface 125 of each attachment block 119 and 120 and a corresponding containing element 128, respectively 129, also having a cross section substantially shaped as a right trapezoid, hollow inside, and external sizes equal to those of the corresponding seating 121, 122.

[0041] Preferably, each containing element 128 and 129 is made from a metal section bar and is configured to be attached to the mobile element 12 or to the fixed structure 13 by means of first screws 130, which can be inserted through its corresponding first through holes 131.

[0042] The clamping proper of the strip 14 and the simultaneous attachment of the attachment blocks 119 and 120 to the mobile element 12 and to the fixed structure 13 are obtained by means of second screws 132 (fig. 9) which, passing through second through holes 133 made in the attachment blocks 119 and 120, clamp the strip 14 between each attachment block 119 and 120 and the corresponding containing element 128 and 129. The second screws 132 can be screwed both on the corresponding containing element 128, 129, and also directly on the mobile element 12 and the fixed structure 13, in this case passing through second through holes 133 made in the same containing elements 128 and 129.

[0043] From the above it is clear that the articulation member 10, 110 has the articulation axis, or fulcrum, F very close to the external surfaces 12a, 12b of the two elements 12 and 13 to be articulated, so that the latter can perform an angular travel as wide as possible, that is up to 180°, when they move from a closed position to an open position or vice versa.

[0044] It is also clear that the articulation member 10, 110, during use, is almost completely inserted inside the two elements 12 and 13 to be articulated, so that when the latter are in a closed position, the part of the articulation member 10, 110 visible from the outside is reduced to a minimum, and consists only of the central zone 14c of the strip 14, so that it can be considered to all effects a "hidden" articulation member.

[0045] Moreover, it is clear that modifications and/or additions of parts can be made to the articulation members 10, 110 as described heretofore, without departing from the field and scope of the present invention.

[0046] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of articulation members, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Articulation member to articulate two elements (12, 13) with respect to each other, comprising two attachment blocks (19, 20; 119, 120), one configured to be associated with a first of said elements (12) and the other with a second of said elements (13), and a strip (14) of flexible material, having substantially the shape of an oblong parallelepiped with two lateral edges (15, 16) parallel to each other, between which two lateral zones (14a, 14b) are comprised and a central zone (14c) configured to act as an articulation axis (F), said strip (14) being configured to be attached to said attachment blocks (19, 20; 119, 120) in correspondence with said lateral zones (14a, 14b), **characterized in that** each of said attachment blocks (19, 20; 119, 120) comprises an external surface (24; 124) and an internal surface (25; 125) that form between them a determinate angle (α) of less than 90°, **and in that** said strip (14) has a substantially constant thickness and is configured to be attached in correspondence with said lateral zones (14a, 14b) to the internal surfaces (25; 125) of said attachment blocks (19, 20; 119, 120), by means of a containing element (17, 18; 128, 129) belonging to or coupled with each of said attachment blocks (19, 20; 119, 120), so that said strip (14) is bent by an angle at the top of less than 180° when said two elements (12, 13) to be articulated are disposed in a closed position, with the external surfaces (24; 124) of said attachment blocks (19, 20; 119, 120) parallel to each other and facing each other.

2. Articulation member as in claim 1, **characterized in that** said attachment blocks (19, 20; 119, 120) are preferably identical to each other, are made from a section bar and are configured to be assembled in a specular manner in corresponding seatings (21, 22; 121, 122) of said two elements (12, 13) to be articulated.

3. Articulation member as in claim 1 or 2, **characterized in that** said attachment blocks (19, 20) have an oblong shape, with a cross section substantially in

the shape of a right triangle, in which said external surface (24) is parallel to, or coincides with, a side of said right triangle and said internal surface (25) is parallel to, or coincides with, the hypotenuse of said right triangle.

4. Articulation member as in any claim hereinbefore, **characterized in that** said determinate angle (α) is comprised between 5° and 85°, preferably about 45°, so that said strip (14) is bent by an angle at the top comprised between 10° and 180°, preferably about 90° when said two elements (12, 13) to be articulated are disposed in said closed position.

5. Articulation member as in any claim hereinbefore, **characterized in that** said containing element (17, 18) comprises a slit (17, 18) made in a corresponding attachment block (19, 20) with a width substantially equal to the substantially constant thickness of said strip (14) and configured to accommodate with slight play a corresponding lateral zone (14a, 14b) of said strip (14), the internal surface (25) of each of said attachment blocks (19, 20) constituting one of the internal walls of the corresponding slit (17, 18).

6. Articulation member as in claim 4, **characterized in that** each slit (17, 18) defines a thin flexible tongue (23) disposed cantilevered and in a single body with the remaining part of the attachment block, and configured to clamp, during use, a lateral zone (14a, 14b) of said strip (14) against the corresponding internal surface (25) of the attachment block (19, 20).

7. Articulation member as in claim 1 or 2, **characterized in that** said attachment blocks (19, 20) have an oblong shape, with a cross section substantially in the shape of a right trapezoid, wherein said external surface (124) is parallel to, or coincides with, the base of said right trapezoid and said internal surface (125) is parallel to, or coincides with, the inclined side of said right trapezoid.

8. Articulation member as in claim 7, **characterized in that** said containing element (128, 129) is autonomous with respect to the corresponding attachment block (119, 120), it too has a cross section substantially in the shape of a right trapezoid, hollow inside, and is configured to be coupled with a corresponding attachment block (119, 120) by interposing one of said lateral zones (14a, 14b) of said strip (14), which is thus attached to the corresponding internal surface (125) of said attachment block (119, 120).

9. Articulation member as in claim 8, **characterized in that** said strip (14) is configured to be clamped with its lateral zones (14a, 14b) between the internal surface (125) of each of said attachment blocks (119, 120) and the corresponding containing element (128, 129).

10. Articulation member as in any claim hereinbefore, **characterized in that** said strip (14) is made with one or more threads, or strands, of non-extendible material, preferably interwoven with each other, it has a width comprised between 10 mm and 50 mm, preferably between 15 mm and 30 mm, and its substantially constant thickness is comprised between 0.5 mm and 3 mm, preferably between 1 mm and 2 mm.

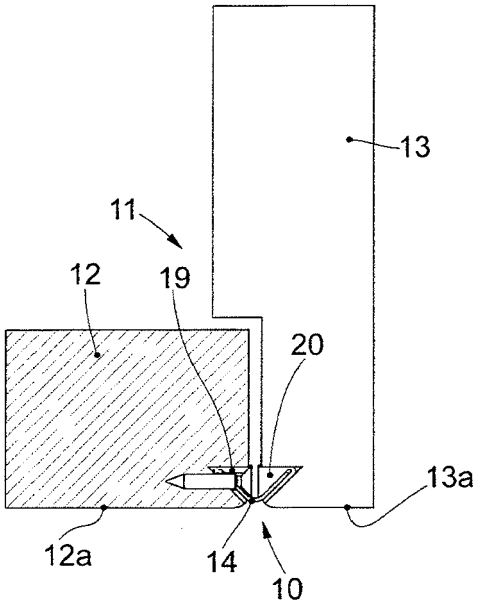

fig. 1

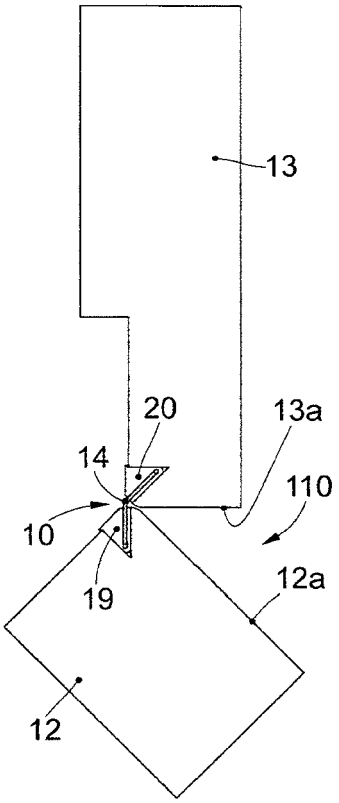

fig. 2

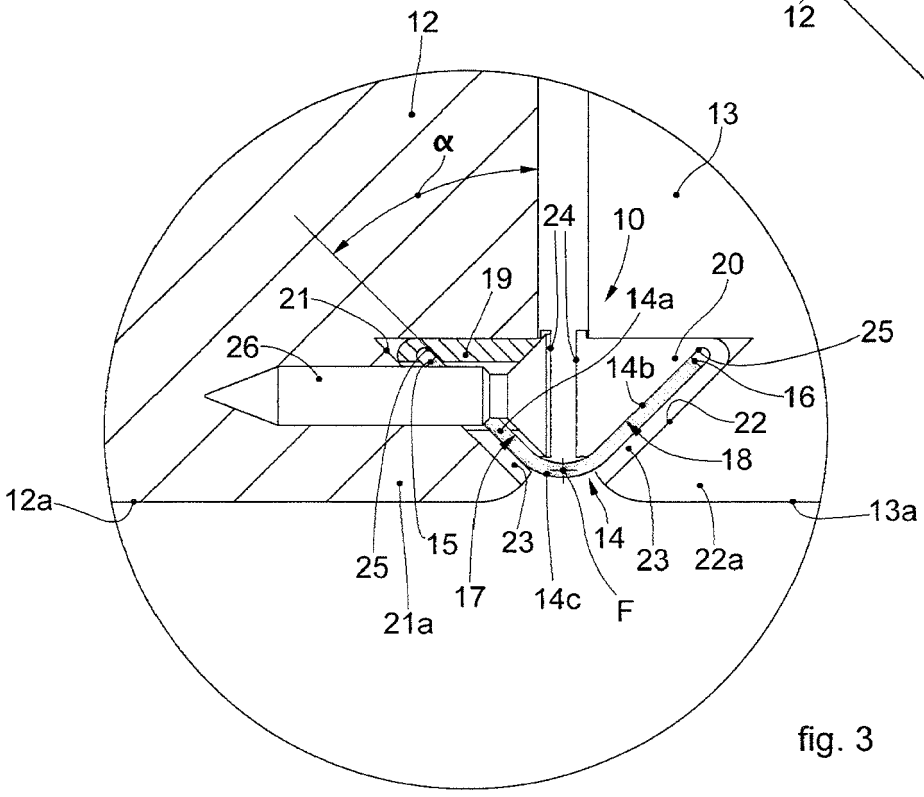

fig. 3

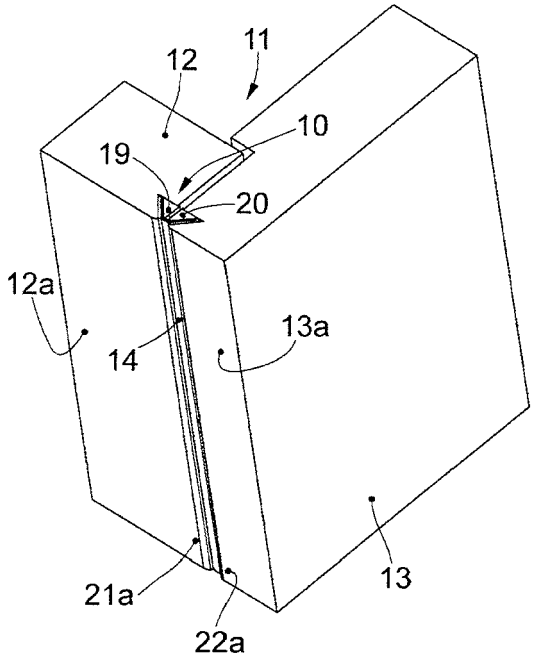

fig. 4

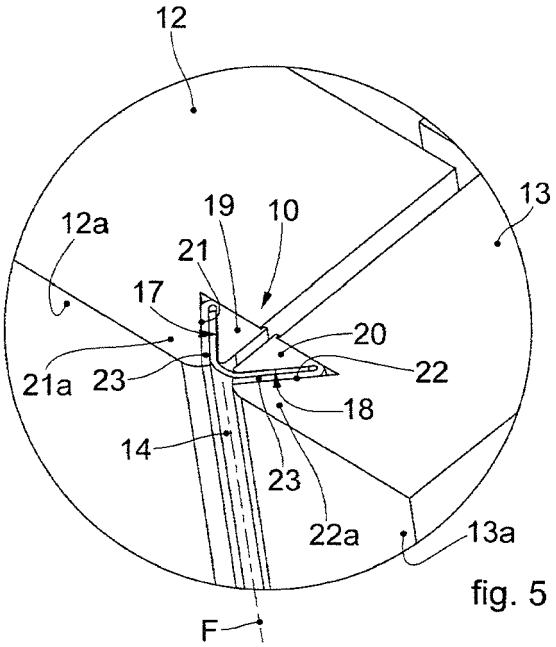

fig. 5

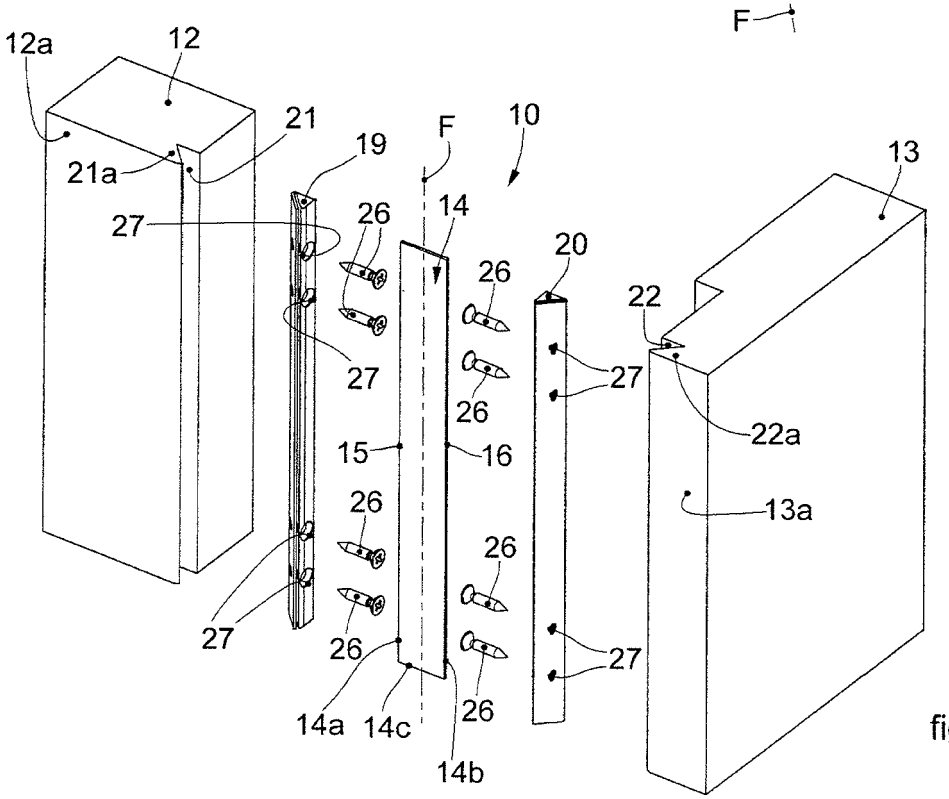

fig. 6

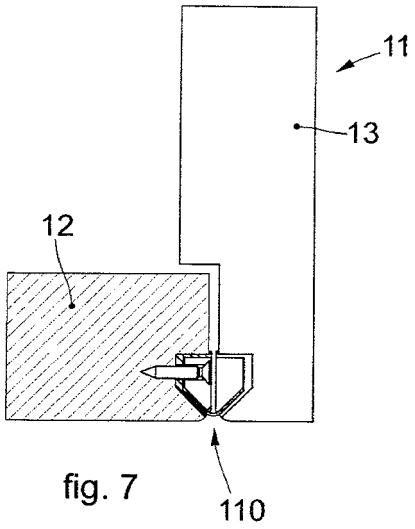

fig. 7

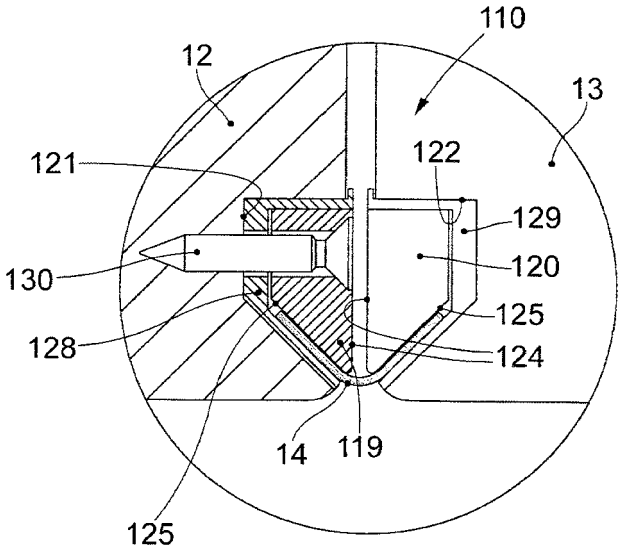

fig. 8

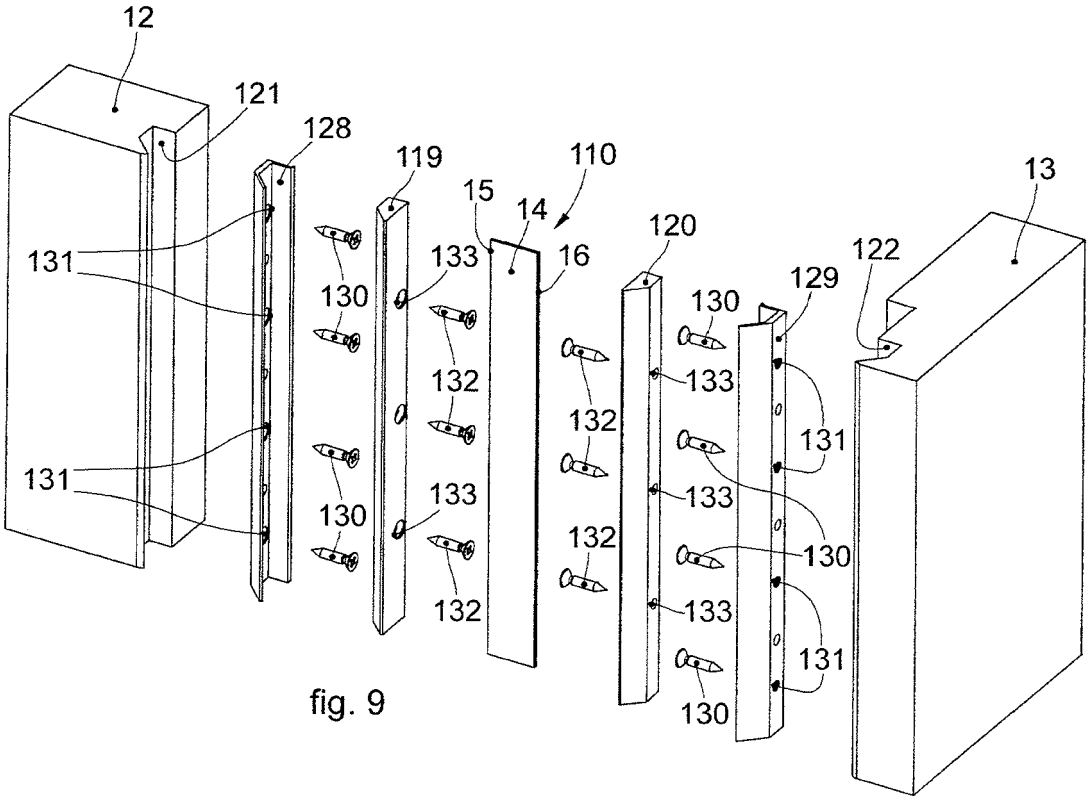

fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 0727

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	DE 31 16 146 A1 (HUEPPE JUSTIN GMBH [DE]) 11 November 1982 (1982-11-11)	1-5,10	INV. E05D1/02
Y	* page 3, paragraph 2 *	7	
A	* page 5, paragraph 2 * * page 6, last paragraph - page 7, paragraph 2 * * figure 1 *	6,8,9	

Y,D	US 2 507 965 A (EICHNER FERDINAND R) 16 May 1950 (1950-05-16)	7	
A	* column 1, lines 20-39 * * column 2, lines 2-33,30-43 * * figures 1,3 *	1-6,8-10	

A,D	NL 7 102 126 A (SERGIO BURELLI (IT)) 20 August 1971 (1971-08-20) * page 2, line 23 - page 3, line 7 * * page 3, line 31 - page 4, line 18 * * figures 1,2 *	1-10	

A,D	FR 2 736 379 A1 (ALUGRIP [FR]) 10 January 1997 (1997-01-10) * page 7, line 15 - page 8, line 27 * * figures 6-9 *	1-10	TECHNICAL FIELDS SEARCHED (IPC) E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 November 2017	Wagner, Andrea

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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